

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-249821

(43)Date of publication of application : 14.09.2000

(51)Int.Cl.

G02B 5/20

(21)Application number : 11-053774

(71)Applicant : DAINIPPON PRINTING CO LTD

(22)Date of filing : 02.03.1999

(72)Inventor : KOBAYASHI HIRONORI

OKABE MASAHIITO

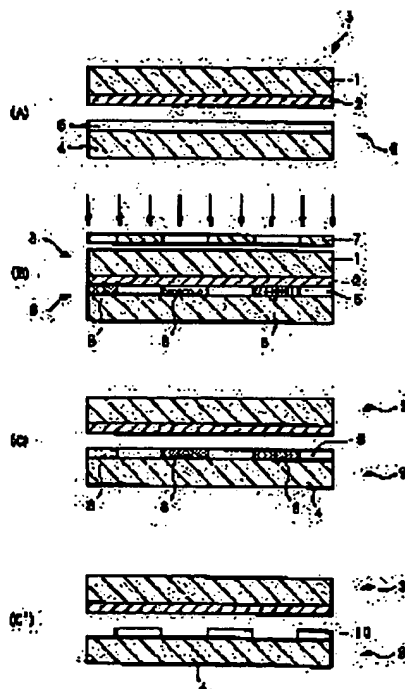
YAMAMOTO MANABU

(54) PRODUCTION OF PATTERN FORMED BODY

(57)Abstract:

PROBLEM TO BE SOLVED: To produce a pattern formed body by a method by which a pattern can be formed with high precision, post-treatment after exposure is not necessary and the deterioration of the pattern formed body itself is not caused because a photocatalyst is not contained in the pattern formed body.

SOLUTION: A substrate 1 with at least a photocatalyst-containing layer 2 and a substrate 6 for a pattern formed body with at least a characteristic varying layer 5 whose characteristic is varied by the action of the photocatalyst in the photocatalyst-containing layer 2 are disposed in such a way that the photocatalyst-containing layer 2 and the characteristic varying layer 5 come in contact with each other and exposure is carried out. The characteristic of the characteristic varying layer 5 in the exposed part is varied and then the substrate 1 on the photocatalyst-containing layer side is removed to obtain the objective pattern formed body with a pattern having a varied characteristic on the characteristic varying layer 5.



LEGAL STATUS

[Date of request for examination] 01.04.2002

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of a new pattern formation object usable for various kinds of applications including printing.

[0002]

[Description of the Prior Art] Conventionally, various kinds of things are manufactured as the manufacture approach of the pattern formation object which forms various patterns, such as a design, an image, an alphabetic character, and a circuit, on a base material.

[0003] For example, the lithography version which will be used for the lithography which is a kind of the printing approach if printing is mentioned as an example and explained manufactures the Taira version which has the pattern which consists of an oleophilic part which receives ink, and a part which does not receive printing ink, forms the image of the ink which should be printed to an oleophilic part using this Taira version, and is imprinting and printing the image which formed on paper etc. In such printing, in this way, patterns, such as an alphabetic character and a graphic form, are formed and the printing version which is a pattern formation object is manufactured, and it is used for the printing version original edition to the printing machine, equipping. Many things are proposed by the printing version original edition for offset printing which is the typical lithography version.

[0004] The printing version for offset printing is producible by the approach of exposing and developing through the mask describing a pattern to the printing version original edition, or the approach of exposing directly and engraving directly on the printing version original edition with an electrophotography method. The electrophotography-type offset plate original edition is produce by the approach of obtaining the offset original edition, i.e., a pattern formation object, by preparing the photoconduction layer which used a photoconductivity particle and binding resin, such as a zinc oxide, as the principal component on a conductive base material, exposing with an electrophotography method, making an oleophilic high image form in a photo conductor front face, processing with desensitization liquid continuously, and carrying out hydrophilization of the non-image part by making this into a photo conductor. It is immersed bywater etc., and considers as non-dense oiliness, printing ink is received by the oleophilic image part, and a hydrophilic part is imprinted by paper etc. However, in pattern formation, the processing after various exposure of processing with desensitization liquid etc. is needed.

[0005] Moreover, the approach of producing the lithography original edition using the heat mode record ingredient which can form the pattern which consists of a part where receptiveness is high, and a part of ** ink nature to ink by the exposure of laser is also proposed. Although it had the description that a heat mode record ingredient had unnecessary processes, such as development, and the printing version could only be manufactured only by form an image by laser light, there was a technical problem in the problem of processings, such as the residues, such as solid-state-like matter which deteriorated with adjustment of the reinforcement of laser, and laser, print durability, etc.

[0006] Moreover, pattern exposure is performed to the photoresist layer applied on the base material as an approach of forming a high definition pattern, a photoresist is developed after exposure, it etches

further or the manufacture approach of the pattern formation object by the photolithography of forming the target pattern directly by exposure of a photoresist is learned using the matter which has functionality in a photoresist.

[0007] Although formation of the highly minute pattern by photolithography is used for formation of the coloring pattern of the color filter used for a liquid crystal display etc., formation of a micro lens, manufacture of a minute electrical circuit substrate, manufacture of the chromium mask used for exposure of a pattern, etc. Since it is necessary to develop negatives with liquid development liquid after exposure, or to etch while using a photoresist depending on these approaches When there was a trouble of it being necessary to process waste fluid etc. and the matter of functionality was used as a photoresist, there was also a trouble of deteriorating by the lye used in the case of development.

[0008] Although forming high definition patterns, such as a color filter, by printing etc. was also performed, there were problems, such as location precision, in the pattern formed by printing, and formation of a highly precise pattern was difficult for it.

[0009] On the other hand, in order to solve such a trouble, the manufacture approach of the pattern formation object which forms a pattern using the matter from which wettability changes with operations of a photocatalyst etc. has been considered in this invention person etc. However, since the manufacture approach of the pattern formation object by operation of an old photocatalyst served as the configuration that a photocatalyst is contained in the pattern formation object itself manufactured, also when it had the trouble that degradation may take place with this photocatalyst depending on the class of pattern formation object, there was.

[0010]

[Problem(s) to be Solved by the Invention] This invention makes it a key objective to offer the manufacture approach of the pattern formation object which was made in view of the above-mentioned trouble, and worries about degradation of the pattern formation object itself do not have, either, since the photocatalyst does not contain in the pattern formation inside of the body which it was possible to have formed a pattern with high precision on the occasion of manufacture of a pattern formation object, and the after treatment after exposure was unnecessary, and was manufactured.

[0011]

[Means for Solving the Problem] The photocatalyst content layer side substrate with which this invention has a photocatalyst content layer at least in claim 1 in order to attain the above-mentioned purpose, After arranging the substrate for pattern organizers which has the property change layer from which a property changes with operations of the photocatalyst in said photocatalyst content layer at least so that said photocatalyst content layer and said property change layer may contact, by exposing The manufacture approach of the pattern formation object characterized by acquiring the pattern formation object which has the pattern from which the property changed on the property change layer is offered by changing the property of the property change layer of the exposed part, and subsequently removing a photocatalyst content layer side substrate.

[0012] Thus, since the property of the property change layer of the part exposed by exposing is changed and a pattern is formed after arranging in this invention so that a photocatalyst content layer and said property change layer may contact, especially the after treatment after exposure does not have the need, either, and the pattern formation object which has a high definition pattern can be manufactured. Moreover, after exposure, since a photocatalyst content layer side substrate is removed from a pattern formation object, there is no fear of a photocatalyst content layer not being contained in the pattern formation object itself, therefore receiving degradation with time by operation of the photocatalyst of a pattern formation object.

[0013] In this invention, when a photocatalyst content layer side substrate coats a photocatalyst content layer on the property change layer of the substrate for pattern organizers, it may be formed, so that it may indicate to claim 2, and a photocatalyst content layer side substrate may consist of a transparency substrate and a photocatalyst content layer at least, and the substrate for pattern organizers may be formed independently and it may indicate to claim 3.

[0014] When the substrate for pattern organizers is what is formed in another object and consists of a

photocatalyst content layer and a transparency substrate at least, a photocatalyst content layer side substrate. After contacting this photocatalyst content layer side substrate in the property change layer of the substrate for pattern organizers, exposing and forming a pattern according to an operation of a photocatalyst on a property change layer, this photocatalyst content layer side substrate can be again used by removing this photocatalyst content layer side substrate. That is, it becomes possible by constituting a photocatalyst content layer side substrate in this way to manufacture a pattern formation object using this photocatalyst content layer side substrate any number of times in principle. Therefore, when manufacturing much pattern formation objects at once, it has an advantage.

[0015] On the other hand, when a photocatalyst content layer side substrate coats a photocatalyst content layer on the property change layer of the substrate for pattern organizers and it is formed, it only coats on a property change layer, and it becomes possible to form a photocatalyst content layer side substrate easily, and when there are few manufactures of a pattern formation object, it has an advantage. In addition, when a photocatalyst content layer side substrate is formed by coating a photocatalyst content layer on a property change layer in this way, removal of the photocatalyst content layer after exposure is performed by the approach of tearing off using adhesive tape etc.

[0016] In the manufacture approach of the pattern formation object of this invention, it is desirable that the photocatalysts contained in a photocatalyst content layer are one sort or two sorts or more of matter chosen from a titanium dioxide (TiO_2), a zinc oxide (ZnO), the tin oxide (SnO_2), strontium titanate (SrTiO_3), tungstic oxide (WO_3), the bisumuth oxide (Bi_2O_3), and an iron oxide (Fe_2O_3) so that it may indicate to claim 4. It is desirable that it is a titanium dioxide (TiO_2) as indicated to claim 5 especially. This is because the bandgap energy of a titanium dioxide is high, so it is chemically stable, there is also no toxicity effectively as a photocatalyst and acquisition is also easy.

[0017] In this invention, it is desirable that the substrate for pattern organizers is formed from said property change layer prepared on a substrate and this substrate at least so that it may indicate to claim 6. This is because it is usually desirable that it is formed as a thin film on a substrate from a side on the strength, a cost side, and a functional side since a property change layer has various properties.

[0018] Furthermore, it is desirable that the property change layer in this invention is a wettability change layer from which surface wettability changes with operations of the photocatalyst in a photocatalyst content layer so that it may indicate to claim 7. Although the property of this property change layer has various things, a wettability change can be mentioned as an important thing also in it. Thus, it is because various functional components, for example, color filter, micro lenses, etc. can be form so that it may mention later by becoming possible to form in a pattern formation object the pattern from which wettability changed with operations of a photocatalyst by using a property change layer as a wettability change layer, and making constituents for the functional sections, such as ink, adhere to the part to which this wettability changed.

[0019] In this invention, it is desirable that the above-mentioned wettability change layer is a wettability change layer from which wettability changes so that the contact angle of water may fall by exposure so that it may indicate to claim 8. Thus, if the wettability change layer from which wettability changes is formed so that the contact angle of water may fall by exposure, only the part to which can change the wettability of this layer easily, and can consider the parent ink nature field where the contact angle of water is small as formation, for example, the constituent for the functional sections is made to adhere will become possible [considering as a parent ink nature field easily] by performing exposure etc. Therefore, it is because a color filter, a micro lens, etc. can be manufactured efficiently and it becomes advantageous in cost.

[0020] In this invention, a contact angle with the water on a wettability change layer is 90 degrees or more in the part which is not exposed, and it is desirable that it is 30 or less degrees in the exposed part (claim 9). Since it is the part as which ** ink nature is required, when the contact angle of water is smaller than 90 degrees, the part which is not exposed does not have enough ** ink nature, and since possibility that constituents for the functional sections, such as ink, remain arises, it is not desirable. Moreover, it may be inferior in the breadth of constituents for the functional sections, such as ink in this part, to have made the contact angle of the water of the exposed part into 30 or less degrees, when

exceeding 30 degrees, for example, when the functional section is the pixel section of a color filter, it is because un-arranging -- a color omission arises -- may arise.

[0021] Moreover, it is desirable that it is the layer in which this wettability change layer contains organopolysiloxane so that it may indicate to claim 10. In this invention, as a property required of a wettability change layer, when light is not irradiated, it is ** ink nature, and when light is irradiated, it is the property of becoming parent ink nature according to an operation of the photocatalyst in the photocatalyst content layer which contacts. As an ingredient which gives such a property to a wettability change layer, it is because organopolysiloxane is mentioned [1st] first.

[0022] It is YnSiX (4-n) (here, Y shows an alkyl group, a fluoro alkyl group, a vinyl group, the amino group, a phenyl group, or an epoxy group, and X shows an alkoxy group or a halogen.) so that it may indicate to claim 11 also in such organopolysiloxane. n is an integer to 0-3. It is desirable that it is organopolysiloxane which is one sort or two sorts or more of the hydrolysis condensates or cohydrolysis condensates of a silicon compound which are shown. It is because such organopolysiloxane is what fulfills the above-mentioned property well.

[0023] In this invention, as indicated to claim 12, the above-mentioned property change layer may be a decomposition removal layer in which decomposition removal is carried out by operation of the photocatalyst in a photocatalyst content layer. Thus, by using a property change layer as the decomposition removal layer in which decomposition removal is carried out by operation of the photocatalyst in a photocatalyst content layer, it will be decomposed by operation of a photocatalyst and the exposed part will be removed. thus -- light -- having hit -- a part -- especially -- after treatment -- need -- there is nothing -- perfect -- decomposition -- removal -- carrying out -- things -- being possible - - since -- for example -- decomposition -- removal -- a layer -- a photoresist -- ** -- carrying out -- here - - a photocatalyst -- content -- a layer -- a side -- a substrate -- contacting -- making -- exposing -- things - - the former -- carrying out -- having had -- development -- a process -- carrying out -- the need -- nothing -- a photoresist -- a pattern -- it can form -- etc. -- versatility -- an application -- it is -- since -- it is .

[0024] In this case, it is desirable that the contact angles of water with the exposed member exposed when decomposition removal of a decomposition removal layer and this decomposition removal layer is carried out so that it may indicate to claim 13 differ.

[0025] Thus, when the contact angles of water with the exposed member exposed when decomposition removal of a decomposition removal layer and this decomposition removal layer is carried out differ, a decomposition removal layer will be decomposed by operation of a photocatalyst, the exposed part will be removed, and an exposed member will expose it to a front face. On the other hand, as for the part which is not exposed, a decomposition removal layer will remain. When it is that from which the contact angle of water differs by the decomposition removal layer and the exposed exposed member here, For example, when a decomposition removal layer is formed with the ingredient of ** ink nature and an exposed member is formed with the ingredient of parent ink nature, it sets. By irradiating light and making a photocatalyst act on the part which forms the functional section beforehand, the decomposition removal layer of the part is removable, the exposed part is a crevice and serves as a parent ink nature field, and the parts which are not exposed are heights and serve as a ** ink nature field. Thereby, it is the crevice in which this functional section is prepared, and the constituent for the functional sections can be made to adhere to the part of a parent ink nature field precisely and easily. Therefore, the functional section can be formed still more precisely than the case where the property change layer mentioned above is a wettability change layer, and it is not necessary to perform after treatment after exposure of a development process or a washing process. For this reason, it is possible to simplify a process easily and the functional component which has the cheap and precise functional section can be obtained.

[0026] Moreover, it is desirable that the contact angle of the water on a decomposition removal layer is 60 degrees or more, and the contact angle of the water of an exposed member front face exposed when decomposition removal of this decomposition removal layer is carried out is 30 or less degrees (claim 14).

[0027] As for the part which is not exposed, a decomposition removal layer will remain in this

invention. Here, since it is the part as which ** ink nature is usually required, when the contact angle of the water on a decomposition removal layer is smaller than 60 degrees, the part which is not exposed does not have enough ** ink nature, and since possibility that the constituent for the functional sections remains arises, it is not desirable.

[0028] On the other hand, decomposition removal of the exposed part is carried out by operation of the photocatalyst in the photocatalyst content layer which a decomposition removal layer contacts.

Therefore, the exposed member currently formed in the bottom of a decomposition removal layer will expose the exposed part to a front face. It is because this part may be inferior in the breadth of the constituent for the functional sections in this part when the contact angle of the water on an exposed member exceeds 30 degrees, since it is the part as which parent ink nature is usually required, and the omission of the constituent for the functional sections in the functional section etc. may arise.

[0029] Thus, since it is desirable for decomposition removal of the decomposition removal layer to be carried out with the photocatalyst in the photocatalyst content layer which contacts, and to have ** ink nature, it is desirable [a decomposition removal layer] that it is the nonionic surface active agent of a hydrocarbon system, a fluorine system, or a silicone system so that it may indicate to claim 15.

[0030] As indicated to claim 16, even if it is an approach using a photo mask, the approach of the pattern exposure in this invention may be based on an optical drawing exposure so that it may indicate to claim 17, and is suitably chosen according to the property of the pattern formation object acquired, an application, etc. Moreover, it is desirable to carry out heating a photocatalyst content layer so that it may indicate to claim 18 on the occasion of exposure. Thus, by exposing heating a photocatalyst content layer, it is for the photocatalyst in the photocatalyst content layer to a property change layer to act with sufficient sensibility.

[0031] In order that this invention may solve the above-mentioned technical problem further, so that it may indicate to claim 19 It is the photocatalyst content layer side substrate which consists of a transparence substrate and a photocatalyst content layer at least. The photocatalyst content layer side substrate for pattern formation object manufacture characterized by forming a pattern formation object is offered by contacting the property change layer and said photocatalyst content layer of the substrate for pattern formation which has the property change layer from which a property changes with operations of a photocatalyst to a front face, and exposing them.

[0032] Thus, the photocatalyst content layer side substrate for pattern formation object manufacture of this invention can form a pattern on a pattern formation object by contacting the photocatalyst content layer in the property change layer of the substrate for pattern organizers, and exposing it. Therefore, it has the advantage that it can be used repeatedly any number of times in principle, by removing from the property change layer after exposure. In this case, it is desirable that the photocatalyst contained in a photocatalyst content layer is a titanium dioxide so that it may indicate to claim 20. This is because the bandgap energy of a titanium dioxide is high, so it is chemically stable, there is also no toxicity effectively as a photocatalyst and acquisition is also easy.

[0033] Moreover, in order to solve the above-mentioned technical problem, this invention offers the pattern formation object characterized by being formed on a substrate and this substrate, having at least the property change layer which has the pattern from which the property changed with operations of a photocatalyst, and not having a photocatalyst content layer so that it may indicate to claim 21.

[0034] The pattern formation object of this invention has at least a substrate and the property change layer which has the pattern from which the property changed with operations of a photocatalyst in this way. It follows, for example, since this pattern formation object can be used as the various printing original editions using the difference of receptiveness with ink when change of this property is a wettability change, it can consider as the various printing original editions of low cost without the need of performing development / washing process etc. on the occasion of manufacture. Moreover, since this pattern formation object does not have a photocatalyst content layer, it has the advantage that there is no possibility that the pattern formation object may deteriorate with time according to an operation of a photocatalyst.

[0035] As for this invention, it is desirable that it is the wettability change layer from which wettability

changes so that a property change layer may fall according to an operation of a photocatalyst and the contact angle of water may fall by exposure especially so that it may indicate to claim 22.

[0036] Thus, wettability can be easily changed by exposing by being the wettability change layer from which wettability changes so that a property change layer may fall according to an operation of the photocatalyst at the time of exposure and the contact angle of water may fall by exposure, and it can consider as the pattern formation object which has the pattern of the parent ink nature field where the contact angle of water is small. Therefore, it is because functional components, such as a color filter and a micro lens, can be manufactured efficiently and it becomes advantageous in cost by making the constituent for the functional sections adhere to the pattern of the parent ink nature field of such a pattern formation object.

[0037] Moreover, this invention is a decomposition removal layer in which decomposition removal of the property change layer is carried out by operation of a photocatalyst so that it may indicate to claim 23, and it is desirable in it being that from which the contact angle of water with the exposed member exposed when decomposition removal of said decomposition removal layer and this decomposition removal layer is carried out differs.

[0038] Thus, by considering as the pattern formation object which is that from which the contact angle of water with the exposed member exposed when a property change layer is used as a decomposition removal layer and decomposition removal of this decomposition removal layer is carried out differs As mentioned above, the pattern formation object with which wettability of a part which prepares the functional section beforehand was made into the parent ink nature field where the contact angle of water is small, and the contact angle of water made other parts the large ** ink nature field can be acquired. The constituent for the functional sections can be made to adhere only to the parent ink nature field where the contact angle of water is small easily by making the constituent for the functional sections adhere to the parent ink nature field pattern of such a pattern formation object. Therefore, a functional component can be easily formed from a pattern formation object like the case where the property change layer mentioned above is a wettability change layer, without performing after treatment after exposure of a development process or a washing process. For this reason, it is possible to simplify a process easily and the functional component which has the functional section cheaply can be obtained.

[0039] In this invention, it can consider as a functional component by arranging the functional section on the part corresponding to the pattern formed in the pattern formation object mentioned above so that it may indicate to claim 24. Thus, a functional component can be easily obtained by using the pattern formation object of this invention.

[0040] In this case, it is the pattern formed of the part where the contact angles whose patterns are water differ, and it is desirable that it is the functional component by which the functional section was formed on the part with the small contact angle of water in this pattern so that it may indicate to claim 25. It is because a such functionality component since a functional component can be easily obtained by making the constituent for the functional sections adhere to the parent ink nature field where water and a contact angle are small as this was mentioned above is advantageous in cost.

[0041] The functional component of this invention can be made into a micro lens by using the functional section as a lens so that it may indicate to claim 26, and can consider as the color filter whose functional section is the pixel section and may indicate to claim 27. It is because the advantage of this invention can fully be harnessed by considering as a color filter or a micro lens.

[0042]

[Embodiment of the Invention] Hereafter, the manufacture approach of the pattern formation object of this invention is explained to a detail. The photocatalyst content layer side substrate with which the manufacture approach of the pattern formation object of this invention has a photocatalyst content layer at least, After arranging the substrate for pattern organizers which has the property change layer from which a property changes with operations of the photocatalyst in said photocatalyst content layer at least so that said photocatalyst content layer and said property change layer may contact, by exposing It is characterized by acquiring the pattern formation object with which the pattern from which the property changed was formed on the property change layer by changing the property of the property change layer

of the exposed part, and subsequently removing a photocatalyst content layer side substrate.

[0043] Thus, in the manufacture approach of the pattern formation object of this invention, after arranging so that a photocatalyst content layer and a property change layer may contact, by exposing, the property of the property change layer of the part exposed according to an operation of the photocatalyst in a photocatalyst content layer changes, and the pattern by the part exposed on the property change layer, i.e., the part from which the property changed, is formed. Therefore, since after treatment, such as development, washing, etc. after exposure, becomes unnecessary on the occasion of pattern formation, it is processes fewer than before, and a pattern can be formed cheaply. Therefore, functional components, such as a color filter, can be formed easily and cheaply by forming the functional section along with the pattern of a pattern formation object.

[0044] Furthermore, in this invention, since a photocatalyst content layer side substrate is removed and a pattern formation object side substrate is used as a pattern formation object after changing the property on a property change layer according to an operation of the photocatalyst in a photocatalyst content layer, the photocatalyst content layer is not contained in the pattern formation object acquired.

Therefore, when the functional section is formed in the pattern formation object acquired and it considers as a functional component, it becomes possible to make possibility that a photocatalyst content layer will not be contained inside a functional component, and a functional component will deteriorate with time according to an operation of a photocatalyst for this reason there be nothing.

[0045] The manufacture approach of the pattern formation object of such this invention is explained using a drawing. In addition, the pattern in this invention does not show various patterns, such as a design, an image, a circuit, and an alphabetic character, and it is not limited especially.

[0046] Drawing 1 shows an example of the manufacture approach of the pattern formation object of this invention. In this manufacture approach, the substrate 6 for pattern organizers which consists of a property change layer 5 prepared on the photocatalyst content layer side substrate 3 which consists of a photocatalyst content layer 2 first formed on the transparence substrate 1 and this transparence substrate 1, and a substrate 4 and this substrate 4 is prepared (refer to drawing 1 (A)).

[0047] Next, it is made to stick so that the photocatalyst content layer 2 of this photocatalyst content layer side substrate 3 and the property change layer 5 of the substrate 6 for pattern organizers may contact, and exposes by UV light etc. through a photo mask 7. The property of a part of having been exposed on the property change layer 5 changes by this, and it becomes the property change part 8 (refer to drawing 1 (B)).

[0048] Subsequently, the pattern formation object 9 with which the pattern of the property change part 8 was drawn on the property change layer 5 is formed of what the photocatalyst content layer side substrate 3 is removed from the substrate for pattern organizers for (it detaches) (refer to drawing 1 (C)).

[0049] Moreover, other examples of the manufacture approach of the pattern formation object of this invention are shown in drawing 2. In this example, the substrate 6 for pattern organizers with which the property change layer 5 was first formed on the substrate 4 is prepared (refer to drawing 2 (A)).

Subsequently, the photocatalyst content layer 2 is formed by spreading etc. on this property change layer (refer to drawing 2 (B)). In addition, in this example, this photocatalyst content layer 2 were formed by carrying out spreading etc. serves as the photocatalyst content layer side substrate 3 as used in the field of this invention. And the property change part 8 is formed on the property change layer 5 by exposing through a photo mask 7 like the 1st example of the above (refer to drawing 2 (C)). By finally removing the photocatalyst content layer 2, the pattern formation object 9 with which the pattern of the property change part 8 was formed on the property change layer 5 is acquired (refer to drawing 2 (D)).

[0050] Hereafter, the pattern formation object manufacture approach of this invention is explained in detail by making into an example the two manufacture approaches mentioned above.

[0051] (Photocatalyst content layer side substrate) If the photocatalyst content layer side substrate in this invention has a photocatalyst content layer at least, it contains any substrates. For example, like the example shown in drawing 1, the transparence substrate 1 other than the photocatalyst content layer 2 may be included, and as shown in the example of drawing 2, it may be formed by photocatalyst content

layer 2 independent one. Moreover, other layers may be formed if needed.

[0052] Moreover, although it was applied and formed on the substrate 6 for pattern organizers like the example which it may be obtained by forming the photocatalyst content layer 2 on the transparence substrate 1, and may be beforehand formed in another object with the substrate for pattern organizers, and is shown in drawing 2 as shown in the example of drawing 1, this photocatalyst content layer side substrate may be formed so that it may be [like] united with the substrate for pattern organizers.

[0053] If the photocatalyst content layer side substrate 3 is formed in the substrate 6 for pattern organizers, and another object as shown in drawing 1 Drawing 1 (A) As shown in - (C), contact this photocatalyst content layer side substrate 3 in the property change layer 5 of the substrate 6 for pattern organizers, and it exposes. After forming a pattern according to an operation of a photocatalyst on the property change layer 5, this photocatalyst content layer side substrate 3 can be again used by removing this photocatalyst content layer side substrate 3. That is, by constituting a photocatalyst content layer side substrate in this way, when becoming possible to use this photocatalyst content layer side substrate and manufacturing much pattern formation objects any number of times in principle, it has an advantage.

[0054] Thus, when forming a photocatalyst content layer side substrate in the substrate for pattern organizers, and another object, it is desirable to have a transparence substrate at least from relation, such as reinforcement and cost, in addition to a photocatalyst content layer. That is, as shown in drawing 1, it becomes advantageous in cost from the case where could bear the reinforcement at the time of using it repeatedly, and it forms in another object only in the photocatalyst content layer 2, by considering as the configuration in which the photocatalyst content layer 2 was formed on the transparence substrate 1.

[0055] As long as such a photocatalyst content layer side substrate has the part which had the photocatalyst content layer and the transparence substrate at least, and the photocatalyst content layer has exposed to one side, it may be what kind of configuration. For example, the photo mask may be elsewhere formed in one and the protective layer etc. may be formed in the perimeter. Moreover, even if it exposes completely in drawing 1 (B), a contact inhibition layer may be formed in the shape of a mask pattern on a photocatalyst content layer, and the part in contact with a property change layer may be restricted in the shape of a pattern, and the photocatalyst content layer itself may be formed in the shape of a pattern so that a property change part can be formed in the shape of a pattern on a property change layer.

[0056] Since reinforcement is not needed for a photocatalyst content layer side substrate on the other hand when spreading etc. carries out a photocatalyst content layer on the base material 6 for pattern organizers and a photocatalyst content layer side substrate is formed in one, as shown in drawing 2, it is advantageous, when the layer for maintenance on the strength becomes unnecessary and it acquires a small number of pattern formation object.

[0057] If a photocatalyst content layer is contained at least also in this case, in order to form what kind of layer in others, for example, to make easy removal of this photocatalyst content layer side substrate, the adhesive layer etc. may be prepared beforehand. Moreover, this photocatalyst content layer may be formed in the shape of a pattern.

[0058] (Photocatalyst content layer) As mentioned above, the photocatalyst content layer 2 is contained in the photocatalyst content layer side substrate 3 at least:

[0059] As long as this photocatalyst content layer is the configuration that the property of a property change layer that the photocatalyst in a photocatalyst content layer contacts is changed, it is not limited especially, may consist of a photocatalyst and a binder, and may be produced with a photocatalyst simple substance. Moreover, especially the wettability of the front face may be parent ink nature, or may be ** ink nature.

[0060] Although the mechanism of action of the photocatalyst represented by titanium dioxide which is mentioned later in this photocatalyst content layer is not necessarily clear, it is considered that the carrier generated by the exposure of light exerts change on the chemical structure of the organic substance by the direct reaction with a nearby compound or oxygen, and the reactive oxygen species produced under existence of water. In this invention, this carrier is considered to be what exerts an operation on the

compound in the property change layer which contacts on a photocatalyst content layer.

[0061] As a photocatalyst used by this invention, the titanium dioxide (TiO_2) known as an optical semiconductor, a zinc oxide (ZnO), the tin oxide (SnO_2), strontium titanate (SrTiO_3), tungstic oxide (WO_3), the bismuth oxide (Bi_2O_3), and an iron oxide (Fe_2O_3) can be mentioned, it can choose from these, and one sort or two sorts or more can be mixed and used.

[0062] Especially in this invention, bandgap energy is high, and is chemically stable, toxicity does not have it, either, and a titanium dioxide is suitably used from acquisition being easy. Although there are an anatase mold and a rutile mold in a titanium dioxide and each can be used for it by this invention, the titanium dioxide of an anatase mold is desirable. An anatase mold titanium dioxide has excitation wavelength in 380nm or less.

[0063] As such an anatase mold titanium dioxide, the anatase mold titania sol (STS[by Ishihara Sangyo Kaisha, Ltd.]- 02 (7nm of mean diameters), ST-K01 by Ishihara Sangyo Kaisha, Ltd.) of a hydrochloric-acid amalgam-decomposition mold, the anatase mold titania sol (TAmade from Nissan Chemistry- 15 (12nm of mean diameters)) of a nitric-acid amalgam-decomposition mold, etc. can be mentioned, for example.

[0064] Since a photocatalysis occurs effectively so that it is small, it is desirable, and the particle size of a photocatalyst has mean particle diameter or desirable 50nm or less, and it is desirable especially to use a photocatalyst 20nm or less.

[0065] The photocatalyst content layer in this invention may be formed by the photocatalyst independent, as mentioned above, and it mixes with a binder and it may be formed.

[0066] When forming by the photocatalyst independent, in the case of a titanium dioxide, an amorphism titania is formed on a transparence substrate or a property change layer, and the approach of subsequently to a crystalline titania carrying out a phase change by baking etc. is mentioned. As an amorphism titania used here, organic titanium compounds, such as hydrolysis of the mineral salt of titanium, such as a titanium tetrachloride and sulfuric-acid titanium, dehydration condensation, tetra-ethoxy titanium, tetraisopropoxy titanium, tetra--n-propoxytitanium, tetrabutoxytitanium, and tetramethoxy titanium, can be obtained by hydrolysis and dehydration condensation under acid existence, for example. Subsequently, it can denaturalize to an anatase mold titania by baking in 400 degrees C - 500 degrees C, and can denaturalize to a rutile mold titania by 600 degrees C - 700 degrees C baking.

[0067] Moreover, when using a binder, what has high binding energy with which the main frame of a binder is not decomposed by optical pumping of the above-mentioned photocatalyst can mention the organopolysiloxane which explanation of the wettability change layer mentioned later explains in detail by the way as such a binder preferably.

[0068] Thus, when organopolysiloxane is used as a binder, the above-mentioned photocatalyst content layer can distribute in a solvent the organopolysiloxane which is a photocatalyst and a binder with other additives if needed, can prepare coating liquid, and can form it by applying this coating liquid on a transparence substrate or a property change layer. As a solvent to be used, the organic solvent of alcoholic systems, such as ethanol and isopropanol, is desirable. Spreading can be performed by the well-known methods of application, such as a spin coat, a spray coat, a DIBBU coat, a roll coat, and a bead coat. When the component of an ultraviolet curing mold is contained as a binder, it can do [forming a photocatalyst content layer or] by irradiating ultraviolet rays and performing hardening processing.

[0069] Moreover, an amorphism silica precursor can be used as a binder. This amorphism silica precursor is expressed with a general formula SiX_4 , and the silanol which are the silicon compounds which are a halogen, a methoxy group, an ethoxy radical, or an acetyl group, and those hydrolyzates, or the with an average molecular weight of 3000 or less polysiloxane of X is desirable.

[0070] Specifically, a tetra-ethoxy silane, tetra-isopropoxysilane, tetra--n-propoxysilane, tetrabutoxysilane, a tetramethoxy silane, etc. are mentioned. Moreover, after making homogeneity distribute the precursor of an amorphism silica, and the particle of a photocatalyst in a nonaqueous nature solvent, making it hydrolyze with the moisture in air and making a silanol form on a transparence substrate in

this case, a photocatalyst content layer can be formed by carrying out dehydration condensation polymerization in ordinary temperature. If dehydration condensation polymerization of a silanol is performed above 100 degrees C, the polymerization degree of a silanol can improve the reinforcement on increase and the front face of the film. Moreover, independent or two sorts or more can be mixed and used for these binders.

[0071] The content of the photocatalyst in a photocatalyst content layer can be preferably set up in 20 - 40% of the weight of the range five to 60% of the weight. Moreover, the thickness of a photocatalyst content layer has desirable within the limits of 0.05-10 micrometers.

[0072] Moreover, a photocatalyst content layer can be made to contain the surfactant other than the above-mentioned photocatalyst and a binder. Specifically, it is Nikko Chemicals NIKKOL. BL, BC, Hydrocarbon systems, such as each series of BO and BB, Du Pont ZONYL FSN, FSO, Asahi Glass Make Sir Chlorofluorocarbon S- 141 and 145 -- Dainippon Ink & Chemicals Make Megger Fuck F- 141, 144, FUTAJIENTO F-200 made from NEOSU, F251, and uni-dyne DS[by Daikin Industries, LTD.]- 401, 402, and the product made from Three Em -- Fluorad FC-170 and 176 grades a fluorine system Or it can do [mentioning the nonionic surface active agent of a silicone system, or], and a cation system surfactant, an anion system surfactant, and an amphoteric surface active agent can also be used.

[0073] In a photocatalyst content layer, besides the above-mentioned surface active agent, furthermore, polyvinyl alcohol, Unsaturated polyester, acrylic resin, polyethylene, diallyl phthalate, An ethylene propylene dien monomer, an epoxy resin, phenol resin, Polyurethane, melamine resin, a polycarbonate, a polyvinyl chloride, A polyamide, polyimide, styrene butadiene rubber, chloroprene rubber, Oligomer, such as polypropylene, polybutylene, polystyrene, polyvinyl acetate, polyester, polybutadiene, polybenzimidazole, the poly acrylic nitril, epichlorohydrin, polysulfide, and polyisoprene, a polymer, etc. can be made to contain.

(Transparence substrate) In this invention, as shown in drawing 1 , as for the photocatalyst content layer side substrate 3, it is desirable to consist of photocatalyst content layers 2 formed on the transparence substrate 1 and this transparence substrate 1.

[0074] This transparence substrate will not be limited, especially if it is the quality of the material which penetrates light, such as UV light, so that it can expose from the side in which the photocatalyst content layer 2 of a photocatalyst content layer side substrate is not formed in the case of exposure for example, as shown in drawing 1 (B). The transparent flexible material which has the flexibility of the transparent rigid material which does not have the flexibility of quartz glass, Pyrex glass, a synthetic quartz plate, etc., for example or a transparence resin film, the resin plate for optics, etc. as the desirable quality of the material can be mentioned.

[0075] (Pattern formation the body and its function substrate) In the manufacture approach of the pattern formation object of this invention, as shown in drawing 1 and drawing 2 , the photocatalyst content layer side substrate 3 and the substrate 6 for pattern organizers which were first mentioned above are prepared.

[0076] Although this substrate for pattern organizers is not limited especially if it has a property change layer at least, it is desirable that this property change layer is formed on a substrate from relation, such as reinforcement. Moreover, although other protective layers etc. may be formed as long as it is required, the property change layer needs to be exposed to one [at least] whole field surface or partial target.

[0077] In this invention, the substrate for pattern organizers shows the substrate in the condition that the pattern by the property change part is not yet formed in the property change layer, it exposes to this substrate for pattern organizers, and that by which the pattern of a property change part was formed on the property change layer is used as a pattern formation object.

[0078] (Property change layer) It is good also as a layer which may be what kind of layer as long as the property change layer in this invention is a layer from which a property changes with operations of a photocatalyst, for example, mixes the organic coloring matter disassembled by operation of photochromic ingredients, such as a SUPIRO pyran, or a photocatalyst into a property change layer in a property change layer, and colors a property change layer according to an operation of a photocatalyst.

[0079] Moreover, the part exposed by, for example, using polymer ingredients, such as polyolefines, such as polyethylene and polypropylene, etc. is good also considering the layer a polar group is introduced, or a surface condition will be in a coarse condition, and made it whose adhesive property with various matter improve according to an operation of a photocatalyst as a property change layer. Thus, by using a property change layer as the adhesive change layer from which an adhesive property changes, it becomes possible to form an adhesive good pattern by pattern exposure. The pattern formation object which has the pattern of such an adhesive good part becomes possible [forming the pattern of a metaled thin film] by vapor-depositing a metal component on such a pattern formation object for example, forming a metaled thin film, and subsequently exfoliating a metal thin film with a binder, drugs, etc. using an adhesive difference. According to this approach, it becomes possible to form the pattern of a metal thin film, without forming the pattern of a resist, and a printed circuit board, an electronic-circuitry component, etc. which have a pattern higher definition than what is depended on print processes can be formed.

[0080] Thus, although it will not be limited especially if a property change layer is a layer which has the various properties of changing with operations of a photocatalyst When it is the wettability change layer in which wettability changes [a property change layer] with operations of a photocatalyst in this invention, and the pattern by wettability is formed especially, And since the case where it is two in the case of being the decomposition removal layer in which decomposition removal of the property change layer is carried out by operation of a photocatalyst, and the pattern by irregularity is formed pulls out the effectiveness of this invention from relation, such as a functional component obtained especially, it is desirable.

[0081] (Wettability change layer) The wettability change layer as used in the field of this invention means the layer which can form the pattern by the part to which surface wettability changed with operations of the photocatalyst at the time of exposure, and wettability changed. Although especially this wettability change layer is not limited, it is desirable that this wettability change layer is a wettability change layer from which wettability changes so that the contact angle of water may fall by exposure.

[0082] Thus, by performing pattern exposure etc. by considering as the wettability change layer from which wettability changes so that the contact angle of water may fall by exposure, wettability can be changed easily and the pattern of the parent ink nature field where the contact angle of water is small can be formed. By exposing only the part in which is followed, for example, the functional section on this wettability change layer is formed, it becomes possible to consider as a parent ink nature field easily, and a functional component can be easily formed by making the constituent for the functional sections adhere to this part. Therefore, it is because a functional component can be manufactured efficiently and it becomes advantageous in cost.

[0083] Here, a parent ink nature field is a field where the contact angle of water is small, and suppose that the wettability good field to the constituent for the functional sections, for example, the ink for coloring, the constituent for micro-lens formation, etc., is said. Moreover, a ** ink nature field is a field where the contact angle of water is large, and the wettability to the ink for coloring, the constituent for micro-lens formation, etc. decides to say a bad field.

[0084] As for the above-mentioned wettability change layer, in the part which the contact angle of the water is not exposing, it is desirable that it is 140 degrees or more preferably 90 degrees or more. Since the part which this is not exposing is a part as which ** ink nature is required in this invention, when its contact angle of water is smaller than 90 degrees, ** ink nature is not enough and it is because possibility that constituents for the functional sections, such as ink for coloring, remain arises, so it is not desirable.

[0085] Moreover, when the above-mentioned wettability change layer is exposed, it is desirable that it is the layer which the contact angle of water falls and becomes 20 or less degrees more preferably 30 or less degrees. When exceeding 30 degrees, the contact angle of the water of the exposed part was made into 30 or less degrees because the breadth of constituents for the functional sections, such as ink for coloring in this part, may have been inferior and the chip of the functional section etc. may have arisen.

[0086] In addition, the contact angle of water here says the value which used and measured the contact angle measuring instrument (CAI made from Consonance Interface Science Z mold), 30 seconds after waterdrop is dropped from a micro syringe.

[0087] As an ingredient used for such a wettability change layer With the ingredient from which wettability changes with the property of the wettability change layer mentioned above, i.e., the photocatalyst in the photocatalyst content layer which contacts by exposure And if it has the principal chain which it deteriorates and is hard to disassemble according to an operation of a photocatalyst Although not limited especially, chloro or alkoxysilane is hydrolyzed by (1). sol gel reaction etc., for example. Organopolysiloxane, such as organopolysiloxane which carries out a polycondensation and demonstrates big reinforcement, and organopolysiloxane which constructed the bridge in reactant silicone excellent in (2) ***** or oil repellency, can be mentioned.

[0088] In the case of above (1), it is general formula: $Y_nSiX_{(4-n)}$ (here, Y shows an alkyl group, a fluoro alkyl group, a vinyl group, the amino group, a phenyl group, or an epoxy group, and X shows an alkoxyl group, an acetyl group, or a halogen.). n is an integer to 0-3. It is desirable that it is organopolysiloxane which is one sort or two sorts or more of the hydrolysis condensates or cohydrolysis condensates of a silicon compound which are shown. In addition, as for the carbon number of the radical shown by Y here, it is desirable that it is within the limits of 1-20, and, as for the alkoxy group shown by X, it is desirable that they are a methoxy group, an ethoxy radical, a propoxy group, and a butoxy radical.

[0089] Specifically Methyltrichlorosilane, methyl tribrom silane, methyl trimethoxysilane, Methyl triethoxysilane, a methyl triisopropoxy silane, MECHIRUTORI t-butoxysilane; Ethyl trichlorosilane, Ethyl tribrom silane, ethyl trimethoxysilane, ethyltriethoxysilane, An ethyl triisopropoxy silane, ECHIRUTORI t-butoxysilane; n-propyl trichlorosilane, n-propyl tribrom silane, n-propyltrimethoxysilane, n-propyl triethoxysilane, n-propyl triisopropoxy silane, n-pro PIRUTORI t-butoxysilane; n-hexyl trichlorosilane, To n-, KISHIRU tribrom silane, n-hexyl trimethoxysilane, To n-hexyl triethoxysilane and n-, a KISHIRU triisopropoxy silane, n - It passes. KISHIRUTORI t-butoxysilane; n-decyltrichlorosilane, n-decyltribromsilane, n-decyltrimethoxysilane, n-decyltriethoxysilane, n-DESHIRU triisopropoxy silane, n-DESHIRUTORI t-butoxysilane; n-octadecyltrichlorosilane, n-octadecyl tribrom silane, n-octadecyltrimethoxysilane, n-octadecyl triethoxysilane, n-octadecyl triisopropoxy silane, n-OKUTADESHIRUTORI t-butoxysilane; Phenyl trichlorosilane, Phenyl tribrom silane, phenyl trimethoxysilane, phenyl triethoxysilane, A phenyl triisopropoxy silane, FENIRUTORI t-butoxysilane; A tetra-KURORU silane, A tetra-bromine silane, a tetramethoxy silane, a tetra-ethoxy silane, Tetra-butoxysilane, dimethoxy diethoxysilane; A dimethyl dichloro silane, dimethyl -- a jib -- a ROM silane, dimethyl dimethoxysilane, and a dimethyl diethoxysilane; diphenyl dichloro silane -- diphenyl -- a jib -- a ROM silane, diphenyl dimethoxysilane, and a diphenyl diethoxysilane; phenylmethyl dichloro silane -- phenylmethyl -- a jib -- a ROM silane and phenylmethyl dimethoxysilane -- Phenylmethyl diethoxysilane; TORIKURORU hydrosilane, TORIBU ROM hydrosilane, Trimethoxy hydrosilane, triethoxy hydrosilane, triisopropoxy hydrosilane, Tri(t-butoxy) hydrosilane; Vinyl trichlorosilane, vinyl tribrom silane, Vinyltrimethoxysilane, vinyltriethoxysilane, a vinyl triisopropoxy silane, BINIRUTORI t-butoxysilane; Trifluoro propyl trichlorosilane, Trifluoro propyl tribrom silane, trifluoropropyl trimethoxysilane, Trifluoropropyl triethoxysilane, trifluoropropyl triisopropoxysilane, Trifluoro pro PIRUTORI t-butoxysilane; gamma-glycidoxy propyl methyldimethoxysilane, Gamma-glycidoxypropylmethyldiethoxysilane, gamma-glycidoxypropyltrimethoxysilane, gamma-glycidoxy propyltriethoxysilane, gamma-glycidoxy propyl triisopropoxy silane, gamma-glycidoxy pro PIRUTORI t-butoxysilane; Gamma-metaacryloxypropylmethyldimethoxysilane, gamma-metaacryloxypropylmethyldiethoxysilane, gamma-meta-acryloxypropyltrimethoxysilane, gamma-meta-acryloxypropyltriethoxysilane, a gamma-meta-acryloxypropyl triisopropoxy silane, gamma-meta-acryloxy pro PIRUTORI t-butoxysilane; gamma-aminopropyl methyl dimethoxysilane, gamma-aminopropyl methyldiethoxysilane, gamma-aminopropyl trimethoxysilane, gamma-aminopropyl triethoxysilane, gamma-aminopropyl triisopropoxy silane, gamma-amino pro PIRUTORI t-butoxysilane; Gamma-mercaptpropylmethyl dimethoxysilane, gamma-

mercapto propylmethyl diethoxysilane, gamma-mercapto propyltrimethoxysilane, gamma-mercapto propyl triethoxysilane, gamma-mercapto propyl triisopropoxy silane, gamma-mercapto pro PIRUTORI t-butoxysilane; beta-(3, 4-epoxycyclohexyl) ethyl trimethoxysilane, beta-(3, 4-epoxycyclohexyl) ethyltriethoxysilane;,, those partial hydrolysate;,, and those mixture can be used.

[0090] Moreover, the polysiloxane containing especially a fluoro alkyl group can use preferably, one sort or two sorts or more of hydrolysis condensates of the following fluoro alkyl silane and a cohydrolysis condensate are mentioned, and, specifically, what was generally known as a fluorine system silane coupling agent can be used.

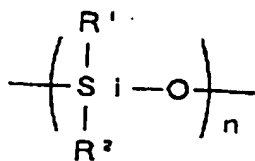
[0091] CF₃ (CF₂)₃CH₂CH₂Si (OCH₃)₃; CF₃ (CF₂)₅CH₂CH₂Si (OCH₃)₃; CF₃ (CF₂)₇CH₂CH₂Si (OCH₃)₃; CF₃ (CF₂)₉CH₂CH₂Si (OCH₃)₃; (CF₃)₂CF (CF₂)₄CH₂CH₂Si (OCH₃)₃; (CF₃)₂CF (CF₂)₆CH₂CH₂Si (OCH₃)₃; (CF₃)₂CF (CF₂)₈CH₂CH₂Si (OCH₃)₃; CF₃ (C₆H₄)C₂H₄Si (OCH₃)₃; CF₃ (CF₂)₃ (C₆H₄)C₂H₄Si (OCH₃)₃; CF₃ (CF₂)₅ C₂H₄Si (C₆H₄)₃; CF₃ (OCH₃)₇ (CF₂) C₂H₄Si (C₆H₄)₃; CF₃ (OCH₃)₃CH₂CH₂SiCH₃ (CF₂)₂; CF₃ (OCH₃)₅CH₂CH₂SiCH₃ (CF₂)₂; CF₃(CF₂)₇CH₂CH₂SiCH₃(OCH₃)₂; CF₃(CF₂)₉CH₂CH₂SiCH₃(OCH₃)₂; (CF₃)₂CF(CF₂)₄CH₂CH₂SiCH₃ (OCH₃)₂; (CF₃)₂CF(CF₂)₆CH₂CH₂Si (OCH₃) CH₃ ₂; (OCH₃)₂CF(CF₂)₈CH₂CH₂Si (CF₃) CH₃ ₂; CF₃ (OCH₃) C₂H₄SiCH₃ (C₆H₄)₂; CF₃ (OCH₃)₃ (CF₂) C₂H₄SiCH₃ (C₆H₄)₂; CF₃ (OCH₃)₅ (CF₂) C₂H₄SiCH₃ (C₆H₄)₂; CF₃ (OCH₃)₇ (CF₂) C₂H₄SiCH₃ (C₆H₄)₂; CF₃ (OCH₃)₃CH₂CH₂Si (OCH₂CH₃)₃; CF₃(CF₂)₅CH₂CH₂Si(OCH₂CH₃)₃; CF₃(CF₂)₇CH₂CH₂Si(OCH₂CH₃)₃; CF₃(CF₂)₉CH₂CH₂Si(OCH₂CH₃)₃; (CF₂) And CF₃(CF₂)₇SO₂N(C₂H₅) C₂H₄CH₂Si₃ (OCH₃).

[0092] By using the polysiloxane containing the above fluoro alkyl groups as a binder, the ** ink nature of the non-exposing section of a wettability change layer improves greatly, and discovers the function which bars adhesion of constituents for the functional sections, such as ink for coloring.

[0093] Moreover, the compound which has the frame expressed with the following general formula as the above-mentioned reactant silicone of (2) can be mentioned.

[0094]

[Formula 1]



[0095] However, n is two or more integers, R₁ and R₂ are the permutation or the unsubstituted alkyls, the alkenyl, the aryls, or the cyano alkyl groups of carbon numbers 1-10, respectively, and 40% or less of the whole is vinyl, phenyl, and halogenation phenyl in a mole ratio. Moreover, since R₁ and R₂ become [surface energy] the smallest [the thing of a methyl group], it is desirable, and it is desirable that a methyl group is 60% or more in a mole ratio. Moreover, in a chain end or a side chain, it has reactant radicals, such as at least one or more hydroxyl groups, in a chain.

[0096] Moreover, the stable ORGANO silicone compound which does not carry out crosslinking reaction like dimethylpolysiloxane with the above-mentioned organopolysiloxane may be mixed.

[0097] The wettability change layer in this invention can be made to contain a surfactant further.

Specifically, it is Nikko Chemicals NIKKOL. BL, BC, Hydrocarbon systems, such as each series of BO and BB, Du Pont ZONYL FSN, FSO, Asahi Glass Make Sir Chlorofluorocarbon S- 141 and 145 -- Dainippon Ink & Chemicals Make Megger Fuck F- 141, 144, FUTAJIENTO F-200 made from NEOSU, F251, and uni-dyne DS[by Daikin Industries, LTD.]- 401, 402, and the product made from Three Em -- Fluorad FC-170 and 176 grades a fluorine system Or it can do [mentioning the nonionic surface active agent of a silicone system, or], and a cation system surfactant, an anion system surfactant, and an amphoteric surface active agent can also be used.

[0098] In a wettability change layer, besides the above-mentioned surface active agent, moreover, polyvinyl alcohol, Unsaturated polyester, acrylic resin, polyethylene, diallyl phthalate, An ethylene

propylen dien monomer, an epoxy resin, phenol resin, Polyurethane, melamine resin, a polycarbonate, a polyvinyl chloride, A polyamide, polyimide, styrene butadiene rubber, chloroprene rubber, Oligomer, such as polypropylene, polybutylene, polystyrene, polyvinyl acetate, polyester, polybutadiene, polybenzimidazole, the poly acrylic nitril, epichlorohydrin, polysulfide, and polyisoprene, a polymer, etc. can be made to contain.

[0099] Such a wettability change layer can distribute in a solvent the component mentioned above with other additives if needed, can prepare coating liquid, and can form it by applying this coating liquid on a substrate. As a solvent to be used, the organic solvent of alcoholic systems, such as ethanol and isopropanol, is desirable. Spreading can be performed by the well-known methods of application, such as a spin coat, a spray coat, a DIBBU coat, a roll coat, and a bead coat. Moreover, when the component of an ultraviolet curing mold is contained, it can do [forming a wettability change layer or] by irradiating ultraviolet rays and performing hardening processing.

[0100] In this invention, it is desirable especially more desirable than relation, such as a wettability change rate by the photocatalyst, that it is 0.001 micrometers to 1 micrometer, and the thickness of this wettability change layer is within the limits of 0.01-0.1 micrometers.

[0101] Using an operation of oxidation of the organic radical and additive which are a part of above-mentioned component, decomposition, etc., the wettability of the exposure section can be changed, it can consider as parent ink nature, and wettability with the non-exposing section can be made to produce a big difference according to an operation of the photocatalyst in the photocatalyst content layer which contacts by using the wettability change layer of the component mentioned above in this invention. Therefore, by raising the receptiveness (parent ink nature) and rebounding nature (** ink nature) of the constituent for the functional sections, for example, the ink for coloring etc., it is the fitness of quality and functional components, such as an advantageous color filter also in cost, can be obtained.

[0102] (Decomposition removal layer) A decomposition removal layer is explained below. When this decomposition removal layer is exposed, it is a layer by which decomposition removal of the decomposition removal layer of the part exposed by the operation of the photocatalyst in a photocatalyst content layer is carried out. For example, in drawing 1 , when the property change layer 5 is a decomposition removal layer, decomposition removal will be carried out by operation of a photocatalyst, and the property change part of drawing 1 (C) can acquire the pattern-formation object with which the pattern of the decomposition removal layer 10 and the concavo-convex pattern which in other words the decomposition removal layer 10 was removed, and the lower substrate 4 exposed were formed, as shown in drawing 1 (C'). Moreover, the pattern formation object with which the concavo-convex pattern which the decomposition removal layer 10 was removed and the substrate 4 exposed was similarly formed on the substrate 4 in drawing 2 can be acquired (refer to drawing 2 (D')).

[0103] Thus, since decomposition removal of the exposed part is carried out by operation of a photocatalyst, a decomposition removal layer can form the pattern which consists of a part with a decomposition removal layer, and a part which is not, i.e., the pattern which has irregularity, without performing a development process and a washing process. Therefore, the member which needs the pattern of the irregularity of the various printing version original editions etc. can be easily formed by this approach. Moreover, since decomposition removal is carried out, the decomposition removal layer of the part exposed by applying this decomposition removal layer on a screen, making a photocatalyst content layer side substrate contact, and carrying out pattern exposure can form the original edition of screen-stencil without development / washing process. Furthermore, when this decomposition removal layer is formed for the material which has a resist property, the pattern of a resist can be easily formed by making a photocatalyst content layer side substrate contact, and carrying out pattern exposure. Therefore, using for a semi-conductor production process etc. is also possible as a photoresist without development / washing process.

[0104] in addition -- this -- decomposition -- removal -- a layer -- exposure -- depending -- a photocatalyst -- an operation -- oxidative degradation -- carrying out -- having -- evaporation -- etc. -- carrying out -- having -- things -- from -- development - washing -- a process -- etc. -- being special -- after treatment -- nothing -- removing -- having -- a thing -- it is -- although -- the quality of the material

of a decomposition removal layer -- a washing process etc. -- you may carry out .

[0105] Moreover, when this decomposition removal layer is used, it is also possible to form a pattern by the difference of a property with the exposed member and decomposition removal layer which it not only forms irregularity, but decomposition removal is carried out and it exposes. As such a property, although various things, such as an adhesive property and color enhancement, can be mentioned, it is desirable to be able to mention wettability and to form a pattern by this wettability difference especially, in this invention, in respect of the effectiveness at the time of finally forming a component.

[0106] That is, in this invention, it is that it is desirable to be constituted so that the contact angles of water with the exposed member which decomposition removal of a decomposition removal layer and this decomposition removal layer is carried out, and is exposed may differ, it is desirable especially desirable that the contact angle of the water on a decomposition removal layer is especially larger than the contact angle of the water of an exposed member, and a contact angle with the water of a decomposition removal layer is 60 degrees or more.

[0107] Since the part by which this is not exposed in this invention serves as, the part, i.e., the heights, in which a decomposition removal layer remains, it is more desirable to make the constituent for the functional sections adhere to the crevice which the decomposition removal layer was removed and the exposed member exposed rather than making the constituent for the functional sections adhere to these heights. For this reason, it becomes desirable that a decomposition removal layer shows ** ink nature that the constituent for the functional sections cannot adhere easily, it is [direction] desirable and its contact angle of the water on a decomposition removal layer is larger than the contact angle of the water of an exposed member. When the contact angle of the water on a decomposition removal layer is smaller than 60 degrees, since possibility that constituents for the functional sections, such as ink for coloring, fully [** ink nature] remain arises, it is not desirable.

[0108] It is the ingredient in which decomposition removal is carried out by operation of the property of the decomposition removal layer mentioned above, i.e., the photocatalyst in the photocatalyst content layer which contacts by exposure, as an ingredient used for such a decomposition removal layer, and is the ingredient with which a contact angle with water becomes 60 degrees or more preferably.

[0109] As such an ingredient, the nonionic surface active agent of a hydrocarbon system, a fluorine system, or a silicone system can be mentioned, for example. Specifically, polyoxyethylene alkyl ether, polyoxyethylene alkyl phenyl ether, a perfluoroalkyl ethylene oxide addition product, or a perfluoroalkyl amine oxide can be mentioned as such a thing.

[0110] Such an ingredient is NIKKOL if it is the non-ion system surfactant of a hydrocarbon system. BL, If it is the non-ion system surfactant of each series (a trade name, Japanese surfactant industrial company make) of BC, BO, and BB, a fluorine system, or a silicon system ZONYL [] -- FSN, FSO (a trade name, Du Pont make), and Sir chlorofluorocarbon S- 141 and 145 (a trade name --) the Asahi Glass Co., Ltd. make and megger fuck F- 141 and 144 (a trade name, Dainippon Ink make) -- FUTAJIENTO F200, F251 (a trade name, product made from NEOSU), and uni-dyne DS- 401, 402 (a trade name, Daikin Industries, LTD. make), and Fluorad FC- it can obtain as 170 and 176 (a trade name, three em company make).

[0111] It is possible to use a cation system, an anion system, and an amphoteric surface active agent for others as an ingredient of this decomposition removal layer, and, specifically, alkyl benzene sodium sulfonate, an alkyl trimethylammonium salt, perfluoroalkyl carboxylate, a perfluoroalkyl betaine, etc. can be mentioned.

[0112] Furthermore, as an ingredient of a decomposition removal layer, a polymer or oligomer can be variously used besides a surfactant. As such a polymer or oligomer For example, polyvinyl alcohol, unsaturated polyester, acrylic resin, Polyethylene, diallyl phthalate, an ethylene propylen dien monomer, An epoxy resin, phenol resin, polyurethane, melamine resin, a polycarbonate, A polyvinyl chloride, a polyamide, polyimide, styrene butadiene rubber, Chloroprene rubber, polypropylene, polybutylene, polystyrene, polyvinyl acetate, nylon, polyester, polybutadiene, polybenzimidazole, the poly acrylic nitril, epichlorohydrin, polysulfide, polyisoprene, etc. can be mentioned. In this invention, it is desirable to use the polymer of ** ink nature with a high contact angle with water, such as polyethylene,

polypropylene, polystyrene, and a polyvinyl chloride, especially.

[0113] Such a decomposition removal layer can distribute in a solvent the component mentioned above with other additives if needed, can prepare coating liquid, and can form it by applying this coating liquid on a substrate or an exposed member (a substrate and an exposed member being common.). Spreading can be performed by the well-known methods of application, such as a spin coat, a spray coat, a DIBBU coat, a roll coat, and a bead coat.

[0114] In this invention, it is desirable especially more desirable than relation, such as catabolic rate by the photocatalyst, that it is 0.001 micrometers to 1 micrometer, and the thickness of this decomposition removal layer is within the limits of 0.01-0.1 micrometers.

[0115] (Substrate) As for a property change layer, in the manufacture approach of the pattern formation object of this invention, it is desirable to be formed on a substrate 4 from relation with reinforcement or relation with a final functional component, as shown in drawing 1 and drawing 2. As such a substrate, metals, such as glass, aluminum, and its alloy, plastics, textiles, a nonwoven fabric, etc. can be mentioned according to the application of the functional component formed with the pattern formation object or the pattern formation object.

[0116] Moreover, as mentioned above, when a property change layer is a decomposition removal layer, an exposed member may be prepared between a substrate and a decomposition removal layer. This exposed member is a member exposed when decomposition removal of the decomposition removal layer is carried out by operation of the photocatalyst by exposure, as mentioned above, and it is desirable for a decomposition removal layer to differ from its property, and to be formed. As mentioned above, especially when the above-mentioned property is wettability, it is desirable that a contact angle with water is the thing of 30 or less degrees. As such a thing, inorganic materials, such as crystallized glass, the polymer ingredient which carried out hydrophilization processing of the front face by the plasma or the coupling agent can be mentioned, for example.

[0117] In addition, in this invention, when the above-mentioned substrate has a function as this exposed member, it is not necessary to prepare an exposed member independently.

[0118] (Contact in a photocatalyst content layer and a property change layer) In this invention, as shown in drawing 1 (B) and drawing 2 (C), it needs to be arranged so that the photocatalyst content layer 2 of the photocatalyst content layer side substrate 3 and the property change layer 5 of the substrate 6 for pattern organizers may contact at the time of exposure.

[0119] It is supposed to the contact as used in the field of this invention that the condition of having been arranged in the condition that an operation of a photocatalyst attains to a property change layer substantially is said here. The condition of it being applied on a property change layer, being formed, and being stuck as shown in drawing 2 (C), And as shown in drawing 1 (B), even when there is no physical contact including the condition of being physically in contact, further, for example, the case where it is arranged so that water or air may intervene in between and an operation of the photocatalyst in a photocatalyst content layer may attain to a property change layer shall also be included. In this invention, as for such a contact condition, between exposure should be maintained at least.

[0120] (Exposure) In this invention, after arranging so that the photocatalyst content layer 2 of the photocatalyst content layer side substrate 3 and the property change layer 5 of the substrate 6 for pattern organizers may contact, as shown in drawing 1 (B) and drawing 2 (C), exposure is performed.

[0121] Even if formation of the pattern by the exposure in this invention is based on exposure through the photo mask 7 as shown in drawing 1 (B) and drawing 2 (C), it may be based on the optical drawing exposure using laser light etc.

[0122] When the above-mentioned photo mask is used, a detailed pattern can be formed by using the reduced-projection-exposure approach which reduces the image of a mask pattern according to contraction optical system. What was formed in the metal plate like the mask for vacuum evaporation as such a photo mask, the thing formed in the glass plate with the chromium metal can use the film for platemaking etc. for a pan for a printing application.

[0123] On the other hand, when based on the optical drawing exposure using laser light etc., a direct predetermined pattern can be drawn using a predetermined drawing exposure system, without using a

photo mask.

[0124] Usually, it is not limited to this and the wavelength of the light used for the exposure which will come can also be made [the range of 400nm or less, and] visible and to have susceptibility on other wavelength by doping of metal ions, such as chromium, platinum, and palladium, addition of a fluorescent material, addition of photosensitive dye, etc., although preferably set up from the range of 380nm or less. As such coloring matter, cyanine dye, such as cyanine dye, carbocyanine coloring matter, dicarbocyanine coloring matter, and a hemicyanine dye, can be mentioned, and diphenylmethane dye, such as triphenylmethane dye, such as a crystal violet and basic fuchsin, xanthene coloring matter like rhodamine B, Victoria blue, the brilliant green, Malachite Green, a methylene blue, pyrylium salt, benzo pyrylium salt, TORIMECHIN benzo pyrylium salt, a triaryl carbonium salt, etc. are mentioned as other useful coloring matter.

[0125] As the light source which can be used for such exposure, a mercury lamp, a metal halide lamp, a xenon lamp, an excimer lamp, an excimer laser, an YAG laser, and the other various light sources can be mentioned.

[0126] Moreover, let the exposure of the light for exposure be the exposure which needs a property change layer to change a property according to an operation of a photocatalyst. Under the present circumstances, by exposing heating a photocatalyst content layer, sensibility is raised and things are made. Especially this is important when using an optical drawing exposure.

[0127] In addition, although exposure can be performed from the photocatalyst content layer side substrate 3 side in drawing 1 (B) and drawing 2 (C), as long as it is not limited to this and, as for the direction of exposure, a substrate 4 and the property change layer 5 penetrate light in this invention, you may expose from the substrate 4 side for pattern organizers.

[0128] Thus, by exposing, the property change layer 5 exposed as shown in drawing 1 (B) and drawing 2 (C) becomes pattern-like with the property change part 8. This property change part turns into a part where adhesive properties differ if it is the adhesive change layer from which it will become a wettability change part, and an adhesive property will change if for example, a property change layer is a wettability change layer from which wettability changes with exposure, and if it is the decomposition removal layer by which decomposition removal is carried out further, it will become with the part in which a crevice is formed.

[0129] (Removal of a photocatalyst content layer side substrate) In this invention, as shown in drawing 1 (C) and drawing 2 (D), after exposure is performed, the pattern formation object 9 with which the pattern of the property change part 8 was formed on the property change layer 5 is acquired by removing the photocatalyst content layer side substrate 3.

[0130] If for example, a photocatalyst content layer side substrate is the case where it is only in contact as shown in drawing 1 , it will become possible [removing by only separating the photocatalyst content layer side substrate 3 from the pattern formation object 9], but as shown, for example in drawing 2 , when the photocatalyst content layer side substrate 3 has stuck to the pattern formation object, it is necessary to tear off removal of this photocatalyst content layer side substrate in this invention using adhesive tape etc.

[0131] (Pattern formation object) As for the pattern formation object acquired by doing in this way, the pattern of a property change part is formed on a property change layer. Therefore, when the property of a property change layer is wettability, since the receptiveness of printing ink is changing, the part where wettability changed can be used as a printing plate. And when the pattern formation object of this invention is used as the printing version original edition, there is no need, such as a wet developing, and it has the effectiveness that creation of the printing version is completed to exposure and coincidence.

[0132] Moreover, since decomposition removal of the exposed part is carried out by operation of a photocatalyst when a property change layer is a decomposition removal layer, a pattern formation object serves as a pattern which has irregularity. Therefore, the pattern formation object which has this irregularity can be used as the various printing version original editions etc. Moreover, when using a substrate as a screen and forming a decomposition removal layer as a property change layer on this screen, since decomposition removal is carried out and the exposed part is removed, it can acquire the

pattern formation object which consists of a part with which the eye of a screen was got blocked, and a part from which it escaped, and can use it as the original edition for screen-stencil.

[0133] (Functional component) Various functional components can be obtained by arranging the functional section further on the part corresponding to the pattern with which this pattern formation object was formed.

[0134] functionality is optical here (optical selective absorption, reflexivity, polarizability, and optical permselectivity --) Luminescence, such as nonlinear optics nature, fluorescence, or phosphorescence, photochromic nature, etc., magnetic (hard magnetism, soft magnetism, nonmagnetic, permeability, etc.) and electric - electronic (conductivity --) insulation, piezoelectric, pyroelectricity, a dielectric, etc. are chemical (adsorbent, release, and catalyst nature --) absorptivity, ion conductivity, oxidation reduction nature, an electrochemistry property, electrochromic nature, etc. -- mechanical (abrasion resistance etc.), thermal (heat-conducting characteristic, adiathermic, infrared emission nature, etc.), and a living body -- various kinds of functional functions (biocompatibility, anti-thrombus nature, etc.) are meant.

[0135] The arrangement to the part corresponding to the pattern of the pattern formation object of such the functional section has various approaches with the property of a property change layer. For example, since the pattern from which the adhesive property changed to the pattern formation object is formed when a property change layer is an adhesive change layer to which an adhesive property is changed, the pattern of the metal as the functional section is formed only in a part with a good adhesive property by making constituents for the functional sections, such as a metal, vapor-deposit over the whole surface on a property change layer, and tearing off with a binder etc. after that. Thereby, a circuit etc. can be formed easily.

[0136] Moreover, when a property change layer is a decomposition removal layer, the pattern from which irregularity changed is formed. Therefore, the functional section can be easily arranged to the part corresponding to a pattern by making the constituent for the functional sections insert and adhere to a crevice. In this case, when the wettability between a crevice and heights has a difference, this constituent for the functional sections adhering [insertion and] become that a ***** crevice is a wettability good parent ink nature field, and heights are wettability bad ** ink nature fields still easier.

[0137] Moreover, since the pattern from which wettability changed is formed when a property change layer is a wettability change layer, by applying the constituent for the functional sections on a pattern formation object, the constituent for the functional sections will adhere and only a wettability good parent ink nature field can arrange the functional section to the part corresponding to the pattern of a pattern formation object easily. In this case, as for the unexposed section of a pattern formation object, it is desirable for 50 or less mN/m of critical surface tension to be 30 or less mN/m preferably.

[0138] As a constituent for the functional sections used for this invention When it changes greatly with the function of a functional component, formation approaches of a functional component, etc. as mentioned above, and forming [for example,] a metaled pattern by adhesive difference When using the pattern formation object from which the pattern formation object from which this constituent for the functional sections serves as a metal, and wettability is different, and irregularity are different, the constituent which is not diluted with the solvent represented by the ultraviolet curing mold monomer etc., the constituent of the shape of a liquid diluted with the solvent, etc. can be used. In the case of the liquid constituent diluted with the solvent, it is desirable that a solvent is what shows high surface tension, such as water and ethylene glycol. Moreover, since a pattern can be formed in a short time so that viscosity is low as a constituent for the functional sections, it is desirable especially when a property change layer is a wettability change layer. However, in the case of the liquid constituent diluted with the solvent, since the rise of the viscosity by volatilization of a solvent and change of surface tension take place at the time of pattern formation, it is desirable for a solvent to be low volatility.

[0139] You may become the functional section after it is processed by drugs after becoming the functional section and having been arranged [and] on a pattern formation object by carrying out adhesion etc. to a pattern formation object, and being arranged as a constituent for the functional sections used for this invention, or being processed by ultraviolet rays, heat, etc. In this case, when the component which carries out effectiveness with ultraviolet rays, heat, an electron ray, etc. is contained

as a binder of the constituent for the functional sections, it is desirable from the ability to form the functional section quickly by performing hardening processing.

[0140] When the formation approach of such a functional component is explained concretely, for example a property change layer is a wettability change layer, the constituent for the functional sections forms the functional section on the pattern of the parent ink nature field formed on the pattern formation object using means, such as a nozzle regurgitation means containing spreading means, such as a DIP coat, a roll coat, a blade coat, and a spin coat, an ink jet, etc. For example, as shown in drawing 3, the property change layer 5 is formed on a substrate 4. How to use the blade coater 10 and apply the constituent 11 for the functional sections on the pattern formation object 9 with which the property change part (parent ink nature field) 8 formed by contacting the property change layer 5 with a photocatalyst content layer, and carrying out pattern exposure was formed, Or as shown in drawing 4, the constituent 11 for the functional sections can be dropped on the same pattern formation object 9, and the approach of applying by the spin coater 12 etc. can be mentioned. Thus, by applying the constituent 11 for the functional sections, the constituent for the functional sections adheres only on the property change part 8 which wettability changed and became a parent ink nature field as shown in drawing 5. A functional component can be formed by stiffening this constituent for the functional sections and considering as the functional section 13.

[0141] Furthermore, the functional component which has the pattern of a metal membrane as the functional section can be obtained by using the pattern formation object of this invention for the metal membrane formation approach by nonelectrolytic plating. This is also an effective approach when a property change layer is a wettability change layer, and it can obtain the functional component which has a desired metal pattern on a property change layer by immersing the pattern formation object which processed with the pretreatment liquid of chemical plating only to the parent ink nature field of the pattern formation object which has the pattern from which wettability changed, and was subsequently processed in chemical plating liquid. Since a metal pattern can be formed according to this approach, without forming a resist pattern, a printed circuit board and an electronic-circuitry component can be manufactured as a functional component.

[0142] Moreover, as mentioned above, after arranging the constituent for the functional sections on the whole surface, you may make it form the functional section along with a pattern by removing an unnecessary part using the difference in the property of the exposure section and the unexposed section. When a property change layer is an adhesive change layer, especially, this is an effective approach, for example, after it sticks adhesive tape, can remove a garbage by after treatment, such as processing by exfoliation by tearing off adhesive tape, blasting of air, and the solvent, and can obtain the pattern of the functional section. As an approach of arranging the functional section all over being such, vacuum film production means, such as PVD and CVD, can be mentioned, for example. That is, the property change layer 5 which has the pattern of the property change part 8 forms the constituent 11 for the functional sections over the whole surface on the pattern formation object 9 established on the substrate 4 by using the membrane formation means 14 using vacuums, such as CVD as shown in drawing 6 (A). thus, as an approach of removing the garbage of the constituent 11 for the functional sections formed in the whole surface By tearing off, after sticking the adhesive face of adhesive tape 15, as shown in drawing 6 (B) By removing the constituent 11 for the functional sections on the unexposed section, and injecting air from the air-injection nozzle 16, as shown in the approach of forming the functional section 13, or drawing 6 (C) The constituent 11 for the functional sections of a garbage can be removed, and the approach of forming the functional section 13 etc. can be mentioned.

[0143] Furthermore, drawing 7 is the formation approach of a functional component especially effective when a property change layer is an adhesive change layer or a wettability change layer. On the pattern formation object 9 with which the property change layer 5 which has the pattern of the property change part 8 as first shown in drawing 7 (A) was formed on the substrate 4 The hot printing object 19 with which the laminating of the thermofusion nature constituent layer 18 was carried out to one side of a sheet 17 is stuck so that the thermofusion nature constituent layer 18 may contact the property change layer 5. Subsequently, as shown in drawing 7 (B), a hot plate 20 is pressed and heated from the sheet 17

side of the hot printing object 19. And as shown in drawing 7 (C), the functional component in which the functional section 13 was formed so that the pattern of the property change part 8 formed on the property change layer 5 might be met can be obtained by tearing off the cooling post heating imprint object 19 (drawing 7 (D)).

[0144] Thus, specifically, a color filter, a micro lens, etc. can be mentioned as a functional component obtained.

[0145] The above-mentioned color filter is used for a liquid crystal display etc., and is formed by the pattern with two or more pixel sections high definition to tops, such as a glass substrate, such as red, green, and blue. By using the pattern formation object of this invention for manufacture of this color filter, it can consider as a high definition color filter by low cost. That is, the pattern formation object with which the pattern from which wettability changed was formed is acquired by using a property change layer as a wettability change layer, for example, and giving pattern exposure to this wettability change layer. Subsequently, to the part (part which became a parent ink nature field by exposure) to which this wettability changed, by adhering and stiffening ink (constituent for the functional sections) for example, with ink jet equipment etc., the pixel section (functional section) can be formed easily and, thereby, a high definition color filter can be obtained by the small routing counter.

[0146] Moreover, when a functional component is a micro lens, the pattern formation object which has the circular pattern from which wettability changed on the wettability change layer is manufactured. Subsequently, if the constituent for lens formation (constituent for the functional sections) is dropped on the part where wettability changed, the contact angle of a drop can be changed only to the parent ink nature field to which wettability changed breadth and by being dropped further. By stiffening this constituent for lens formation, it becomes possible to obtain various configurations or the thing of a focal distance, and a high definition micro lens can be obtained. If the manufacture approach of such a micro lens is explained using drawing 8, the pattern formation object 9 with which the circular pattern of the property change part (parent ink nature field) 8 was formed on the property change layer (wettability change layer) 5 will be prepared. Subsequently The regurgitation of the constituent for the functional sections (ultraviolet-rays hardenability resin constituent) is carried out with regurgitation equipment 21 towards the pattern of this circular property change part (parent ink nature field) 8 (drawing 8 (A)). This constituent 11 for the functional sections (ultraviolet-rays hardenability resin constituent) rises by the wettability difference between the parent ink nature fields and the ** ink nature fields of an unexposed field which are the property change part 8 (drawing 8 (B)). A micro lens 23 is formed by making this use and harden the ultraviolet rays 22 for resin hardening (drawing 8 (C)).

[0147]

[Example] Hereafter, this invention is further explained in full detail through an example.

[0148] [Example 1]

1. Formation isopropyl alcohol 30g of a photocatalyst content layer side substrate, MF-160E(trade name, product made from TOKEMU Products)0.4g whose fluoro alkyl silane is a principal component, trimethoxy methylsilane (Toshiba Silicone make, trade name;TSL8113) 3g, and ST-K01 (trade name; Ishihara Sangyo Kaisha, Ltd. make) 20g which is the titanium-dioxide water dispersing element which is a photocatalyst were mixed, and it agitated for 20 minutes at 100 degrees C. This was diluted 3 times by isopropyl alcohol, and it considered as the constituent for photocatalyst content layers.

[0149] By applying the above-mentioned constituent by the spin coater on the transparence substrate made from soda glass, and performing desiccation processing for 30 minutes at 150 degrees C, the transparent photocatalyst content layer (thickness of 0.2 micrometers) was formed, and the photocatalyst content layer side substrate was formed.

[0150] 2. pattern formation -- the body and its function -- **** of a substrate -- the constituent for wettability change layers which consists of the following presentation was prepared first.

[0151] (Presentation of the constituent for wettability change layers)

- Silicone coating agent (the Toshiba Silicone make, trade name:YSR3022, a presentation; the poly alkyl siloxane and 30 % of the weight of the poly alkyl hydrogen siloxanes, 10 % of the weight of methyl ethyl ketones, 60 % of the weight of toluene) -- The 100 weight sections and catalyst (the Toshiba

Silicone make, trade name:YC6831, a presentation; 40 % of the weight of organotin compounds, 60 % of the weight of toluene) -- Four weight sections and toluene -- The 400 weight sections [0152] This constituent for wettability change layers was applied by the spin coater on the substrate made from soda glass, it heated for 10 minutes at 100 degrees C, the wettability change layer with a thickness of 3 micrometers was formed, and it considered as the substrate for pattern organizers.

[0153] 3. On the wettability change layer of the substrate for the exposure above-mentioned pattern organizers, the photocatalyst content layer side substrate was laid so that the photocatalyst content layer of the above-mentioned photocatalyst content layer side substrate might contact a wettability change layer, the mercury lamp (wavelength of 365nm) performed exposure for 60 seconds with the illuminance of 70 mW/cm² from the photocatalyst content layer side, and the property change part (parent ink nature field) was formed. The result of having measured the contact angle over the water before and behind exposure of a wettability change layer using the contact angle measuring instrument (CA-Z mold made from Consonance Interface Science) (30 seconds after waterdrop being dropped from a micro syringe), To the contact angle of the water before exposure being 110 degrees, the contact angle of the water after exposure was 7 times, the exposed property change part became a parent ink nature field, and it was checked that it is possible to form the pattern by the wettability difference with the exposure section and the non-exposing section.

[0154] 4. Like the formation above-mentioned exposure of a pattern, it exposed through the photo mask of the 100-micrometer Rhine & tooth space, and the pattern formation object was acquired. The red coloring agent of the following presentations was applied by the dip coater on this pattern formation object, and when carrying out UV hardening, the red pattern of the 100-micrometer Rhine & tooth space was created.

[0155] (Red coloring agent presentation)

- UV hardening resin (ester acrylate resin: the Arakawa chemical-industry company make, trade name:AQ-11) -- Ten weight sections and hardening initiator (1-hydroxy cyclohexyl phenyl ketone, the product made from tibia speciality KEMIKARUZU, a trade name: IRUGA cure 184) -- The 0.5 weight sections and red color (Tokyo formation shrine make, a trade name : rose bengal) -- The 0.5 weight sections [0156] 5. The wettability change layer was formed like the above on the transparence substrate made from the production alkali free glass of a color filter, and the substrate for pattern organizers was obtained. Next, it exposed like the above-mentioned exposure through the negative photomask arranged in the pitch whose Rhine of 280 micrometers of openings is 300 micrometers, and the pattern formation object was acquired.

[0157] The pixel section which performs discharge, 100 degrees C, and heat-treatment for 45 minutes with liquid precision regurgitation equipment (the dispenser made from EED, trade name;1500XL-15), and turns into the exposure section (a property change part, parent ink nature field) of this pattern formation object from a red pattern, a blue pattern, and a green pattern in each constituent for the color pixel sections of the following presentations was formed. 2 liquid hybrid model heat-curing agent (the product made from JSR, trade name;SS7265) was applied on the pixel section in the spin coater as a protective layer, 200 degrees C and hardening processing for 30 minutes were performed, the protective layer was formed, and the color filter was obtained.

[0158] (Presentation of the constituent for the pixel sections)

- Pigment (the pigment red 168, pigment Green 36, or pigment blue 60) -- Three weight sections and nonionic surface active agent (made in Nikko Chemicals, trade name;NIKKOL BO-10TX) -- The 0.05 weight sections and polyvinyl alcohol (Shin-Etsu Chemical Co., Ltd. make, trade name; Shin-etsu poval AT) -- The 0.6 weight sections and water -- 97 weight sections [0159] [Example 2]

1. a photocatalyst content layer side substrate and pattern formation -- the body and its function -- the preparation example 1 of a substrate -- the same -- carrying out -- pattern formation -- the body and its function -- this pattern formation after preparing a substrate -- the body and its function -- on the wettability change layer of a substrate, the same constituent for photocatalyst content layers as an example 1 was applied by the spin coater, it heated at 150 degrees C for 30 minutes, the photocatalyst content layer with a thickness of 0.2 micrometers was formed, and this was made into the photocatalyst

content layer side substrate.

[0160] 2. From the exposure photocatalyst content layer side, it exposed like the example 1. Subsequently, after making adhesive tape (Sumitomo 3 M company make, a trade name: Scotchtape) stick to a photocatalyst content layer by pressure, it tore off at the speed of 1 mm/sec. and the photocatalyst content layer was exfoliated. And the contact angle of water was measured on the wettability change layer before and behind exposure like the example 1. To the contact angle of the water before exposure being 95 degrees, the contact angle of the water after exposure was 7 times, the exposed property change part became a parent ink nature field, and it was checked that it is possible to form the pattern by the wettability difference with the exposure section and the non-exposing section.

[0161] [Example 3]

1. Formation ethanol 15g of a photocatalyst content layer side substrate, isopropyl alcohol 15g, and ST-K03 (trade name, Ishihara Sangyo Kaisha, Ltd. make) 30g that is the water dispersing element of the titanium dioxide which is a photocatalyst were mixed, and it agitated for 20 minutes at 100 degrees C, and considered as the constituent for photocatalyst content layers. By applying this constituent by the dip coater on a soda lime glass transparence substrate, and performing heat-treatment for 10 minutes at 150 degrees C, the transparent photocatalyst content film (thickness of 0.2 micrometers) was formed, and the photocatalyst content layer side substrate was formed.

[0162] 2. ZONYL which is formation fluorine system nonionic surface active agent of substrate for pattern organizers FSN (a trade name, Du Pont make) was mixed 2% of the weight to isopropanol, and it considered as the constituent for decomposition removal layers. This constituent for decomposition removal layers was applied by the spin coater on the soda lime glass transparence substrate, it heated for 10 minutes at 50 degrees C, the decomposition removal layer with a thickness of 0.1 micrometers was formed, and it considered as the substrate for pattern organizers.

[0163] 3. On the decomposition removal layer of the substrate for the exposure above-mentioned pattern organizers, the photocatalyst content layer side substrate was laid so that the photocatalyst content layer of the above-mentioned photocatalyst content layer side substrate might contact a decomposition removal layer, exposure was carried out for 2 minutes at the illuminance of 70 mW/cm² by the mercury lamp (wavelength of 365nm) from the photocatalyst content layer side, decomposition removal was carried out in the decomposition removal layer, and the glass of a base material was exposed. As a result of measuring the contact angle over the water on exposure order, i.e., a decomposition removal layer front face, and the front face of glass exposed after exposure like an example 1, to a decomposition removal layer front face being 71 degrees, the glass front face exposed after exposure is 9 times, and it was checked that it is possible to form the pattern by the wettability difference with the exposure section and the non-exposing section.

[0164] 4. Circular opening of 200 micrometers of formation of a micro lens was exposed like the above-mentioned exposure through the negative photomask by which two or more arrangement is carried out at intervals of 100 micrometers, and the pattern formation object was acquired. The constituent for micro lenses of the following presentations was applied to the exposure section of this pattern formation object by 0.0001ml regurgitation method with liquid precision regurgitation equipment (the dispenser made from EED, trade name;1500XL-15), and when carrying out UV hardening, the micro-lens array with a diameter [of 200 micrometers] and a focal distance of 500 micrometers was obtained.

[0165] (Presentation of the constituent for micro lenses)

- UV hardening resin (ester acrylate resin, the Arakawa chemical-industry company make, trade name;AQ-11) -- Ten weight sections and hardening initiator (1-hydroxy cyclohexyl phenyl ketone, the product made from tibia speciality KEMIKARUZU, a trade name: IRUGA cure 184) -- The 0.5 weight sections [0166] In addition, this invention is not limited to the above-mentioned operation gestalt. The above-mentioned operation gestalt is instantiation, and no matter it may be what thing which has the same configuration substantially with the technical thought indicated by the claim of this invention, and does the same operation effectiveness so, it is included by the technical range of this invention.

[0167] For example, in the above-mentioned explanation, although all functional components were explained using the example established on a pattern formation object, this invention is not limited to

this. That is, as shown, for example in drawing 9 , the property change layer 5 is first formed on a substrate 4 by the same approach as the above-mentioned explanation, and the functional section 13 is formed along with the pattern of the property change part of this property change layer 5 (drawing 9 (A)). Next, the base material 24 for component formation is stuck so that this functional section 13 may be touched (drawing 9 (B)). And it is the approach of imprinting the functional section 13 to this base material 24 for component formation, and using as a functional component etc. Thus, a functional component is not limited to being formed on a pattern formation object.

[0168]

[Effect of the Invention] The photocatalyst content layer side substrate with which this invention has a photocatalyst content layer at least, After arranging the substrate for pattern organizers which has the property change layer from which a property changes with operations of the photocatalyst in said photocatalyst content layer at least so that said photocatalyst content layer and said property change layer may contact, by exposing It is the manufacture approach of the pattern formation object characterized by acquiring the pattern formation object which has the pattern from which the property changed on the property change layer by changing the property of the property change layer of the exposed part, and subsequently removing a photocatalyst content layer side substrate.

[0169] Thus, since the property of the property change layer of the part exposed by exposing is changed and a pattern is formed after arranging in this invention so that a photocatalyst content layer and said property change layer may contact, especially the after treatment after exposure does not have the need, either, and the pattern formation object which has a high definition pattern can be manufactured. Moreover, after exposure, since a photocatalyst content layer side substrate is removed from a pattern formation object, the effectiveness that there is no fear of a photocatalyst content layer not being contained in the pattern formation object itself, therefore receiving degradation with time by operation of the photocatalyst of a pattern formation object is done so.

[Translation done.]